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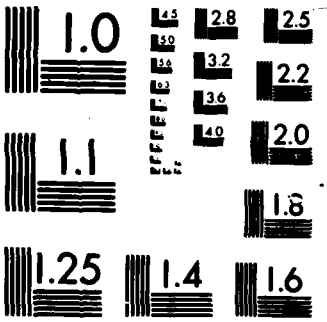

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PREPARATION AND CHARACTERIZATION OF $ZnSiP_2$ AND $ZnGeP_2$ SINGLE CRYSTALS

12 PERSONAL AUTHOR(S)
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Single crystals of $ZnSiP_2$ and $ZnGeP_2$ have been grown by several techniques and their electronic and optical properties were compared. It was found that Fe(III) could not be substituted for equal amounts of Zn(II) and Ge(IV) in the II-IV-V_2 chalcopyrites. However, 0.5 atomic percent of Mn(II) was successfully substituted in the structure for Zn(II)[illegible]

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This annual report covers the period from March 1, 1985 to January 31, 1986. The report is based on a technical report which is being sent out to those on the distribution list as required.

The work during the past year has dealt with the preparation and characterization of $ZnSiP_2$ and $ZnGeP_2$ single crystals. $ZnSiP_2$ crystals were grown from a zinc flux and by chemical vapor transport using chlorine as the transport agent. $ZnGeP_2$ was grown by chemical vapor transport and from the melt by a modified Bridgman method. The stability of $ZnGeP_2$ towards oxidation was determined by heating these compounds in a flowing oxygen stream and determining the change in weight during the heating period. The results indicate that $ZnGeP_2$ is stable up to 740°C. $ZnSiP_2$ also begins to oxidize at approximately 740°C but the rate of its oxidation is much slower than that of $ZnGeP_2$. From the infrared spectral response, absorption bands for $ZnSiP_2$ were observed at approximately 10 and 11.5 μm and for $ZnGeP_2$ at 13 μm. It has been reported that these absorption bands are due to lattice vibrations. In order to demonstrate that these bands were not caused by P-O bonds, $ZnGeP_2$ samples were heated in a flowing oxygen stream at 300°C for 2 hours. The spectrum of the treated samples was exactly the same as the untreated crystals. At present, attempts are being made to substitute tin for germanium into $ZnGeP_2$. The extent of substitution into the II-IV-V_2 chalcopyrites appears to be limited and it will be the purpose of the next reporting period to ascertain the nature and degree of such substitutions.

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